

News from the Savannah River National Laboratory

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SRNL, Toyota to Collaborate on Hydrogen Technology

AIKEN, S.C. – Automaker Toyota has joined forces with the U.S. Department of Energy's (DOE) Savannah River National Laboratory (SRNL) to bring the nation a step closer to making hydrogen-fueled automobiles practical for widespread use.

This research supports President Bush's Hydrogen Fuel Initiative to ensure our nation's long-term energy security and a clean environment. Using hydrogen to fuel our economy can reduce dependence on imported petroleum, diversify energy resources, and reduce pollution and greenhouse gas emissions. To this end, DOE is exploring clean hydrogen production technologies using fossil, nuclear and renewable resources to revolutionize the way we power our nation's cars, homes and businesses.

The Toyota Technical Center U.S.A. (TTC) and SRNL will work together on research and development of an improved hydrogen storage material for potential automotive applications. So far, TTC and SRNL have defined two research and development tasks that they will pursue together. Funding for the two tasks, which amounts to over \$2 million over the next three years, is provided by TTC, Toyota Motor Company's U.S. technical center. About half of the funding will come to SRNL for their portion of the research and development work; the other half will cover TTC's effort

These tasks are being carried out under a five-year Cooperative Research and Development Agreement between SRNL and Toyota, a mutually beneficial relationship in which TTC supports SRNL in achieving its missions, and SRNL uses its expertise and facilities to support TTC in the development of advanced automotive technology. The CRADA provides a framework for SRNL and TTC to identify and collaborate on projects in areas such as hydrogen storage, battery technology, detection and measurement technologies, development of new materials, characterization of materials, reliability and failure prediction, modeling and simulation, and waste treatment technologies.

"The National Nuclear Security Administration sees the collaboration between SRNL and private industry as mutually benefiting the commercial sector *and* NNSA," said Richard Arkin, NNSA Savannah River Site Office manager. "This collaboration will ultimately provide the NNSA and its contractors with improved and more cost-effective hydrogen storage technology that is essential to the long-term defense programs mission at SRS." SRNL's expertise in hydrogen technology grows out of its historical and on-going support for the Savannah River Site's defense-related work with tritium, which is a radioactive form of hydrogen. "Hydrogen has tremendous

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potential to be the ultimate clean fuel of the future,” said SRNL Laboratory Director Dr. G. Todd Wright of Washington Group International. “To make it a reality, however, we still must find answers to some very important technical challenges. Collaborations like this one – where we combine our strengths and skills – are crucial for developing those answers.” Washington Group International subsidiary Westinghouse Savannah River Company operates SRNL for the DOE.

TTC Vice President Jim Griffith said, “This is an exciting opportunity for Toyota to partner with this world renowned U.S. Government Research Laboratory. We look forward to mutually advancing leading edge technologies.”

Toyota has been exploring various new hydrogen and fuel cell technologies for automotive applications. The company has developed and marketed electric vehicles, hybrid gasoline/electric vehicles, and fuel cell hybrid vehicles that use fuel cells to supply electricity to electric motors.

With transportation accounting for over two-thirds of the oil consumed daily, the development of hydrogen technology for the transportation sector could be an important factor in reducing the nation’s dependence on foreign oil and emissions of greenhouse gases in the long term. In his 2003 State of the Union Address, President Bush announced the Hydrogen Fuel Initiative, a commitment to accelerate hydrogen related research to overcome the technological challenges to making hydrogen vehicles, which produce no emissions other than simple water vapor, available and practical for the American family. This agreement will benefit DOE’s hydrogen programs by bringing international partnership and support to the solving of one of those key technological obstacles facing a future hydrogen economy: safe and efficient storage on board a vehicle.

SRNL has five decades of experience in developing technologies for the safe, cost-effective handling, processing and storage of hydrogen. An area of particular SRNL expertise is the use of metal hydrides, metal particles that absorb hydrogen, allowing it to be stored in a safe, stable, easily-handled, easily-contained solid state form. The advantages of solid state storage over storage in a liquid or gas form are obvious, but traditional hydrides have a big drawback: They are very heavy, which makes them unsuitable for use in a vehicle.

A lot of interest has been paid lately to lighter-weight hydride materials. The ultimate goal of the first SRNL-Toyota project is to develop a low-cost hydrogen storage material, with a high hydrogen storage capacity and other characteristics that make it suitable for use on board a vehicle. The other current task will explore ways to make hydrogen storage materials less sensitive to the effects of air and moisture.

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SRNL is the applied research and development laboratory at DOE's Savannah River Site; SRS is the nation's center for the recycling and processing of tritium, a radioactive form of hydrogen used in national defense. SRNL serves DOE and other customers in three key program areas: energy security, national security, and environmental science and process technology. Washington Group International subsidiary Westinghouse Savannah River Company operates SRNL for the DOE.

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